

Observations of the Phenomena of Jupiter's Satellites at Bermerside Observatory, Halifax, in the years 1892 and 1893. By Joseph Gledhill.

Day of Obs. 1893.	Satel- lite.	Pheno- menon.	Phase.	G.M.T. of Observation.	N. Almanac Time.	Remarks.
				h m s	h m s	
Jan. 2	III.	Tr. I.	Ext. contact.	8 40	8 39	Definition poor.
			Bisection.	8 43 30		
			Int. contact.	8 46 45		
4	I.	Oc. D.	Ext. contact.	6 21 10	6 22	Misty.
			Bisection.	6 23 14		
			Just gone.	6 25 7		
	I.	Ec. R.	First seen.	9 54 41	9 54 15	Very misty; planet low.
			Half out?	9 56		
			Full?	9 59		
13	I.	Ec. R.	First seen.	6 19 14	6 18 58	Often cloudy.
			Half out?	6 21		
			Full?	6 23		
	III.	Ec. D.	Last seen.	8 25 2	8 23 13	
	III.	Ec. R.	First seen.	10 7 32	10 11 39	Planet low; bad sky.
			Half out?	10 9		
			Full?	10 12 30		
14	II.	Tr. I.	Ext. contact.	7 16 27	7 18	Fair definition.
			Bisection.	7 17 30		
			Int. contact.	7 19 34		
16	II.	Ec. R.	First seen.	6 35 15	6 34 31	
			Half out?	6 37		
			Full?	6 40		
20	III.	Oc. D.	Ext. contact.	6 41 11	6 46	Fair definition.
			Bisection.	6 45 17		
			Last seen.	6 50 34		
	I.	Ec. R.	First seen.	8 14 36	8 14 44	
			Half out?	8 16		
			Full?	8 19		
	III.	Oc. R.	Bisection.	9 10 14	9 16	Planet low; bad defini- tion.
			Ext. contact.	9 13 17		
27	I.	Oc. D.	Ext. contact.	6 42 13	6 43	Poor definition.
			Last seen.	6 45 9		

Day of Obs.	Satel- lite.	Pheno- menon.	Phase.	G.M.T. of Observation.	<i>N. Almanac</i> Time.	Remarks.
				h m s	h m s	
1893. Feb. 5	I.	Ec. R.	First seen.	6 35 38	6 35 1	
			Half out?	6 38		
			Full?	6 41		
8	II.	Sh. I.	First seen.	7 13	7 14	Windy, cloudy, much motion.
			Int. contact.	7 15 19		
	II.	Tr. E.	Int. contact.	7 18 4	7 22	
			Ext. contact.	7 25 10		
11	I.	Tr. I.	Ext. contact.	7 51 8	7 50	Much boiling on limb of planet.
			Bisection?	7 52 5		
			Int. contact.	7 55 9		
Aug. 14	I.	Tr. I.	Int. contact.	12 14	12 10	Planet very low in E.
	I.	Sh. E.	Int. contact.	12 59 14	12 59	
Sept. 11	II.	Ec. R.	First seen.	10 24 22	10 23 15	Planet very low; much motion.
			Half out?	10 27		
	II.	Oc. D.	Ext. contact.	10 46	10 45	
			Half gone?	10 47		
			Just gone?	10 48		
14	I.	Ec. D.	Fading.	10 0	10 1 41	Violent motion; planet low.
			Half gone?	10 1		
			Just gone.	10 2		
21	III.	Oc. D.	Ext. contact.	10 8	10 6	Much motion.
			Bisection.	10 15		
			Last seen.	10 20		
	III.	Oc. R.	First seen.	11 10	11 23	Bad definition.
			Bisection.	11 15		
			Ext. contact.	11 20		
	I.	Ec. D.	Fading.	11 53	11 55 43	Bad definition.
			Half gone.	11 55		
			Just gone.	11 56 15		
23	I.	Oc. R.	First seen.	9 44 30	9 45	Violent motion; clouds showery.
			Bisection.	9 45 30		
			Ext. contact.	9 46 30		
29	I.	Sh. I.	First seen.	11 8	11 8	
			Int. contact.	11 10		
Oct. 1	I.	Tr. E.	Ext. contact.	8 53	8 53	Planet very low; bad sky.
4	II.	Tr. I.	Ext. contact.	12 10 12	12 9	Definition bad.

Day of Obs. 1893.	Satel- lite.	Pheno- menon.	Phase.	G.M.T. of Observation. h m s	N. Almanac Time. h m s	Remarks.
Oct. 4	II.	Tr. I.	Bisection.	12 12 37		
			Int. contact.	12 14 30		
6	II.	Oc. R.	Half out.	9 27	9 26	Planet low; much motion.
			Ext. contact.	9 29		
8	I.	Tr. I.	Ext. contact.	8 27	8 28	Planet very low.
			Int. contact.	8 30		
	I.	Sh. E.	Int. contact.	9 42 17	9 42	
			Just off.	9 44		
	I.	Tr. E.	Int. contact.	10 35	10 39	
			Bisection.	10 36		
			Ext. contact.	10 38 30		
16	I.	Oc. R.	Half out?	9 32	9 33	Stormy; bad definition.
			Ext. contact.	9 34		
	III.	Tr. I.	First contact.	10 43	10 45	Very difficult and uncertain observation. Sat. moved along south limb of planet.
			Bisection.	10 54		
			Quite on disc.	11 5		
	III.	Tr. E.	Half off.	11 48	11 57	As above; clouds.
22	II.	Tr. E.	Bisection.	8 13	8 13	Clouds.
Dec. 9	I.	Tr. I.	Ext. contact.	5 40	5 39	Good definition.
			Bisection.	5 42		
			Int. contact.	5 44		
	I.	Sh. I.	Int. contact.	6 13	6 11	
	II.	Ec. R.	First seen.	6 41 20	6 42 57	
			Half out?	6 44		
			Full?	6 48		
	I.	Tr. E.	Int. contact.	7 48 16	7 50	
			Bisection.	7 50 39		
			Ext. contact.	7 52 42		
	I.	Sh. E.	Int. contact.	8 20 27	8 23	
			Half off.	8 22 34		
15	I.	Oc. D.	Ext. contact.	10 8 12	10 9	Stormy.
			Half gone.	10 9 51		
			Just gone.	10 10 30		
16	III.	Ec. D.	Fading.	5 10	5 13 42	Often cloudy.
			Half gone?	5 12		
			Just gone.	5 16 25		

Day of Obs.	Satel- lite.	Pheno- menon.	Phase.	G.M.T. of Observation.	N. Almanac Time.	Remarks.
				h m s	h m s	
1893. Dec. 16	II.	Oc. D.	Ext. contact.	5 36	5 38	
	III.	Ec. R.	Half out?	6 48	6 49 40	Cloudy.
	I.	Tr. I.	Ext. contact.	7 26 43	7 23	
			Bisection.	7 27 17		
			Int. contact.	7 28 30		
	I.	Sh. I.	Int. contact.	8 7 19	8 6	
	II.	Ec. R.	First seen.	9 18 10	9 18 21	
			Half out?	9 20		
			Full?	9 23		
	I.	Tr. E.	Int. contact.	9 33 5	9 35	
			Bisection.	9 35 27		
			Ext. contact.	9 37 18		
17	I.	Ec. R.	First seen.	7 27	7 29 21	Clouds passing. The sat. had been out several seconds when first seen at 7 ^h 27 ^m .
23	III.	Oc. R.	Half off?	7 18 7	7 27	A difficult observation, owing to way in which the sat. came off.
			Ext. contact?	7 26 12		
	II.	Oc. D.	Ext. contact.	7 55 14	7 56	Clouds passing.
			Bisection.	7 58 23		
			Just gone.	7 59 19		
	I.	Tr. I.	Ext. contact.	9 10 6	9 9	
			Bisection.	9 13 17		
			Int. contact.	9 15 42		
	III.	Ec. D.	Fading.	9 15	9 15 31	Clouds passing.
			Still visible.	9 17		
25	II.	Tr. E.	Ext. contact.	4 49	4 51	Bad definition; clouds passing.
			Bisection.	4 52		
	II.	Sh. E.	Int. contact.	6 38	6 37	Violent motion.
30	III.	Oc. D.	Ext. contact.	9 13 17	9 16	
1894. Jan. 1	I.	Sh. I.	Int. contact.	6 24 30	6 24	
	I.	Tr. E.	Int. contact.	7 32 18	7 36	
			Bisection.	7 34 6		
			Ext. contact.	7 37 15		
	I.	Sh. E.	Int. contact.	8 34 10	8 37	
	II.	Sh. E.	Int. contact.	9 10 47		Not given in <i>N. Almanac</i> .
2	I.	Ec. R.	First seen.	5 48 19	5 49 42	Hazy sky.

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Day of Obs.	Satel- lite.	Pheno- menon.	Phase.	G.M.T. of Observation.	N. Almanac Time.	Remarks.
1894. Jan. 17	I.	Tr. E.	Int. contact.	h m s 5 39 16	h m s 5 43	
			Bisection.	5 42 21		
			Ext. contact.	5 45 17		
	III.	Tr. I.	Ext. contact.	6 26	6 27	Very difficult, owing to way in which sat. is moving. Times un- certain to at least 1 ^m .
			Bisection.	6 33		
			Int. contact.	6 39		
	II.	Oc. R.	Ext. contact.	6 36	6 38	
	I.	Sh. E.	Int. contact.	6 51	6 56	Overcast ; rain.
22	I.	Tr. I.	Ext. contact.	10 54	10 54	
			Int. contact.	10 58		
23	I.	Oc. D.	Ext. contact.	8 8 51	8 11	
			Bisection.	8 11 7		
			Just gone.	8 13 13		
	I.	Ec. R.	First seen.	11 36 58	11 37 17	
31	I.	Tr. I.	Ext. contact.	7 17 8	7 15	
			Bisection.	7 19 13		
			Int. contact.	7 21 10		
	I.	Sh. I.	Int. contact.	8 35 46	8 34	
	II.	Oc. D.	Ext. contact.	9 14 42	9 16	
			Bisection.	9 16 31		
			Just gone.	9 18 24		
	I.	Tr. E.	Int. contact.	9 25 27	9 28	
			Bisection.	9 27 16		
			Ext. contact.	9 29 18		
Feb. 2	II.	Tr. E.	Int. contact.	6 27 18	6 34	Stormy ; raining.
			Bisection.	6 29 27		
			Ext. contact.	6 31 23		
4	III.	Oc. R.	Ext. contact.	5 51 24	5 53	Stormy ; cloudy.
8	I.	Oc. D.	Ext. contact.	6 26 5	6 27	Stormy.
			Bisection.	6 28 14		
			Just gone.	6 30 18		
	I.	Ec. R.	First seen.	9 57 38	9 58 2	
			Half out ?	10 0		
			Full ?	10 2		
9	II.	Tr. I.	Ext. contact.	6 41 19	6 47	Stormy ; cloudy.
18	II.	Oc. R.	First seen.	6 5 20	6 8	Hazy.

Day of Obs.	Satel- lite.	Pheno- menon.	Phase.	G.M.T. of Observation.	N. Almanac Time.	Remarks.
				h m s	h m s	
1894. Feb. 18	II.	Oc. R.	Ext. contact.	6 6 40		
	II.	Ec. D.	Fading.	6 22	6 25 19	Hazy.
			Just gone.	6 24 26		
	II.	Ec. R.	First seen.	8 41 17	8 41 27	Clear sky.
			Half out?	8 43 15		
			Full?	8 45 12		
24	I.	Ec. R.	First seen.	8 18 27	8 18 47	Wind and snow showers; some thin cloud.
Mar. 1	III.	Tr. E.	Ext. contact.	8 20	8 20	Stormy.
			Bisected.	8 16		
4	I.	Sh. E.	Int. contact.	7 24	7 26	Bad definition.
	II.	Oc. D.	Ext. contact.	9 0 17	9 3	Bad definition.
			Bisection.	9 2 10		
			Just gone.	9 4 32		

Notes.

(Instrument: The $9\frac{1}{2}$ -inch Cooke Refractor, power 240.)

January 14, 1893.—II. Tr. I. The satellite is as bright as the limb of *Jupiter*, perhaps a little brighter. It did not lose any of its apparent brightness as it approached the limb.

February 8.—II. Tr. E. The satellite was not visible till 7^h 10^m; it was on a bright zone.

August 14.—Satellite I. was invisible at 13^h; it passed on to disc at 12^h 14^m.

September 21.—III. Oc. D. The satellite passed behind the disc near the N. pole of *Jupiter*; seemed to skirt the limb; very difficult to observe the phases of the phenomenon.

October 8.—I. Tr. I. The satellite became invisible soon after it had passed on to the disc; it seemed much brighter than the adjacent bright surface of *Jupiter* just before its transit began.

December 9.—I. Tr. I. The satellite was invisible at 6^h 15^m.

December 16.—I. Tr. I. It was invisible at 8^h and at 9^h 15^m.

January 31, 1894.—I. was invisible at 8^h, so also at 9^h and 9^h 15^m.

January 17.—I. in transit; not visible at 5^h, nor at 5^h 30^m; on a grey belt close to a bright zone.

III. Tr. I. Very difficult to say when satellite is just in external contact; satellite not far from S. pole of planet. Similar case on October 16, 1893.

February 18.—II. Oc. R. The satellite when just past external contact looked very small in the dark sky.

Differences of R.A. and N.P.D. of Uranus and 8 Libræ and a Libræ about the time of the conjunction in 1894 April, observed with the Transit-circle at the Royal Observatory, Greenwich.

(Communicated by the Astronomer Royal.)

Comparisons with 8 Librae.

Day.	Observer.	H—* R.A.	Assumed R.A. of *.	Apparent R.A. of H.	Secs. of Tab. R.A.	Error of Tab. R.A.	H—* N.P.D.	Assumed N.P.D. of *.	Apparent N.P.D. of H.	Secs. of Tab. N.P.D.	Error of Tab. N.P.D.
1894.											
Apr. 18	B.	m s + I 35.10	h m s 14 44 51.27	h m s 14 46 26.37	s 26.74	s +0.37	' " +4 50.70	° ' " 105 33 38.92	° ' " 105 38 29.62	" 30.5	" +0.88
21	A. C.	+ I 6.11	51.31	45 57.42	57.82	+0.40	+2 40.85	39.02	36 19.87	20.7	+0.83
27	C. D.	+ 0 7.03	51.38	44 58.41	58.74	+0.33
30	A. C.	— 0 23.00	51.42	44 28.42	28.79	+0.37	—4 06.5	39.42	29 38.77	40.5	+1.73

Comparisons with a Livre.

Apr. 18	B.	+ 1 23'67	14 45	2'71	14 46 26'38	26'74	+ 0'36	+ 2 8'65	105 36 19'90	105 38 28'55	30'5	+ 1'95
21	A. C.	+ 0 54'69	2'75	2'75	45 57'44	57'82	+ 0'38	+ 0 1'36	20'05	21'41	20'7	- 0'71
30	A. C.	- 0 34'49	2'86	2'86	44 28'37	28'79	+ 0'42	- 6 41'30	20'50	39'20	40'5	+ 1'30

The assumed mean places of the stars for 1894.0 are as follows:—

	R.A.	^h	^m	^s	N.P.D.	[°]	'	"	Authority,
8 Libræ	14 44	49	36		105 33	23	42		Ten Year Catalogue, 1880.
a "	"	14 45	079		"	105 36	450	"	Five Year Catalogue of Fundamental Stars, 1890.

In all cases the stars and planet were observed in the same position of the instrument.

The N.P.D differences have been corrected for refraction and parallax.

The tabular places for *Uranus* are those given in the *Nautical Almanac*.

The initials ¹A. C. B., C. D. are those of Mr. Crommelin, Mr. Bryant, and Mr. Davidson, respectively.

Royal Observatory, Greenwich:

1894 May 9.